

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION
(PCT Rule 61.2)

Date of mailing (day/month/year) 15 March 2001 (15.03.01)	To: Commissioner US Department of Commerce United States Patent and Trademark Office, PCT 2011 South Clark Place Room CP2/5C24 Arlington, VA 22202 ETATS-UNIS D'AMERIQUE in its capacity as elected Office
International application No. PCT/GB00/02464	Applicant's or agent's file reference JKH/P101051
International filing date (day/month/year) 27 June 2000 (27.06.00)	Priority date (day/month/year) 30 June 1999 (30.06.99)
Applicant KENINGTON, Peter	

1. The designated Office is hereby notified of its election made:

in the demand filed with the International Preliminary Examining Authority on:

17 January 2001 (17.01.01)

in a notice effecting later election filed with the International Bureau on:

2. The election was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Pascal Piriou Telephone No.: (41-22) 338.83.38
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14

WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference JKH/P101051	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/GB00/02464	International filing date (day/month/year) 27/06/2000	Priority date (day/month/year) 30/06/1999
International Patent Classification (IPC) or national classification and IPC H03F1/32		
Applicant WIRELESS SYSTEMS INTERNATIONAL LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 7 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 7 sheets.

3. This report contains indications relating to the following items:

- I Basis of the report
- II Priority
- III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV Lack of unity of invention
- V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI Certain documents cited
- VII Certain defects in the international application
- VIII Certain observations on the international application

Date of submission of the demand 17/01/2001	Date of completion of this report 29.08.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Agerbaek, T Telephone No. +49 89 2399 8692



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/02464

I. Basis of the report

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1,4-13	as originally filed		
2,3	as received on	20/07/2001 with letter of	17/07/2001

Claims, No.:

9-17	as originally filed		
1-8,18-50	as received on	20/07/2001 with letter of	17/07/2001

Drawings, sheets:

1/7-7/7	as originally filed
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2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

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EXAMINATION REPORT**

International application No. PCT/GB00/02464

4. The amendments have resulted in the cancellation of:

- the description, pages:
 the claims, Nos.:
 the drawings, sheets:

5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 1-50
	No:	Claims none
Inventive step (IS)	Yes:	Claims 1-50
	No:	Claims none
Industrial applicability (IA)	Yes:	Claims 1-50
	No:	Claims none

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/02464

Re Item I

Basis of the report

The examination is being carried out on the **following application documents:**

Text for the Contracting States:

AT BE CH DE DK ES FI FR GB GR IT IE LI LU MC NL PT SE

Description, pages:

1,4-13 as originally filed

2,3 as received on 20/07/2001 with letter of 17/07/2001

Claims, No.:

9-17 as originally filed

1-8,18-50 as received on 20/07/2001 with letter of 17/07/2001

Drawings, sheets:

1/7-7/7 as originally filed

1. Reference is made to the following documents:

D1: US-A-5 164 678 (BOKSBERGER HANS ULRICH ET AL) 17 November 1992

D2: EP-A-0 896 426 (FRANCE TELECOM SA) 10 February 1999

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

2. Novelty and inventiveness of the claims.

- The application is directed to distortion cancelling and discloses methods and means for cancelling the distortion of a device having a nonlinear transfer function. According to the disclosure, a lineariser receives an input signal and splits it up into its constituent frequencies or frequency bands; a gain or amplitude adjustment is performed on each of the frequency signals or bands, selecting, in response to the amplitude of the respective input signals, one coefficient from a predefined or adaptively generated set of coefficients for use in the adjustments; finally, the adjusted signals are recombined to form an output signal from the lineariser.

If such a lineariser is connected in series with a nonlinear device, the distortion of this device may be reduced by the lineariser such that the overall transfer function becomes more linear.

Single independent device claim 1 requires that the linearizer process the input (raw) signal using data selected in response to the amplitude and frequency content of the input signal.

This is novel and inventive over the prior art at hand, for the following reasons:

- Known predistorters operate according to similar principles as those claimed, with the essential difference that they are not responsive to the frequency/amplitude content of the input signal; the entire signal is treated equally over its bandwidth, for example according to a predetermined lookup table indexed by the magnitude of the input signal.

D1, US-A-5 164 678, is an example of such a digital predistorter. Once the polynomial factors K (see D1, fig. 1) corresponding to the nonlinearity of the amplifier 2 have been determined in Ident Processor 3, the predistorter 1 operates on fixed, or periodically updated coefficients which do not change dynamically in response to the input signal

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International application No. PCT/GB00/02464

- Known equalizers or tone controls may split up the input signal into frequency bands, but do not process the input signal in response to any property of it, ie, they merely multiply the signals in each frequency band with a predetermined factor.
 - The ubiquitous Dolby NR and DBX systems split up the input signal into frequency bands and perform amplitude adjustments that are nonlinear. The purpose, however, is not to reduce distortion, but to increase the dynamic range or SNR of a device. This is done by dynamically compressing the input signal of the device and reversing the operation on its output.
Further, these systems essentially do not contain storage means holding data, but operate by means of nonlinear analog elements. Although such a system could be seen as an analog version of the predistorter of claim 1, it cannot fairly be argued that the skilled man would, in an obvious manner, adopt such a noise reduction system to perform a predistortion function, and in the process transform it to the digital domain.
 - D2, EP-A-0 896 426, discloses a method for simulating nonlinear amplifiers. The amplifier is simulated by splitting up its input into frequency bands which are nonlinearly treated in response to the respective amplitudes. However, the apparatus is not a lineariser; it is a software program designed to simulate a response; it is not considered obvious that, or how, such a simulator could be adapted and its function reversed to realize a predistortion function.
 - Single independent device claim 1 and its dependent claims 2-26, and single independent method claim 27 corresponding to claim 1 and its dependent claims 28-50 therefore meet the requirements of the PCT with respect to novelty and inventiveness, Art. 33(2) and (3) PCT.
3. The application meets the requirements of the PCT with respect to industrial applicability, Art. 33(4) PCT, because the subject matter of claims 1-50 can be made or used in industry.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/02464

Re Item VII

Certain defects in the international application

4. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
5. No prior art has been mentioned nor has any document been cited in the description. Only in a short passage on page 8, end of 1st paragraph, does there seem to be prior art involved. This in contrast with Rule 5.1(a)(ii) PCT which requires that some background art be included for understanding the application's contribution to the art.

PARENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference JKH/P101051	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/GB 00/02464	International filing date (day/month/year) 27/06/2000	(Earliest) Priority Date (day/month/year) 30/06/1999
Applicant WIRELESS SYSTEMS INTERNATIONAL LIMITED et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :
 - contained in the international application in written form.
 - filed together with the international application in computer readable form.
 - furnished subsequently to this Authority in written form.
 - furnished subsequently to this Authority in computer readable form.
 - the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
 - the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. Certain claims were found unsearchable (See Box I).

3. Unity of Invention is lacking (see Box II).

4. With regard to the title,

- the text is approved as submitted by the applicant.
- the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- the text is approved as submitted by the applicant.
- the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

- as suggested by the applicant.
- because the applicant failed to suggest a figure.
- because this figure better characterizes the invention.

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None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/02464

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H03F1/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H03F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 896 426 A (FRANCE TELECOM SA) 10 February 1999 (1999-02-10) the whole document ----	1-52
X	DE 196 37 582 A (DAIMLER BENZ AG) 19 March 1998 (1998-03-19) the whole document ----	1,28
X	EP 0 513 402 A (ASEA BROWN BOVERI) 19 November 1992 (1992-11-19) the whole document ----	1,28
A	US 5 164 678 A (BOKSBERGER HANS ULRICH ET AL) 17 November 1992 (1992-11-17) ----	
A	US 5 347 529 A (NOE REINHOLD) 13 September 1994 (1994-09-13) ----	
		-/-

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

° Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

20 October 2000

Date of mailing of the international search report

30/10/2000

Name and mailing address of the ISA

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Authorized officer

Segaert, P

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/02464

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 498 456 A (ORTEL CORP) 12 August 1992 (1992-08-12) -----	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 00/02464

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP 0896426 A	10-02-1999	FR JP	2766992 A 11191716 A	05-02-1999 13-07-1999
DE 19637582 A	19-03-1998	WO EP	9811664 A 0925643 A	19-03-1998 30-06-1999
EP 0513402 A	19-11-1992	NONE		
US 5164678 A	17-11-1992	EP BR CA CN CS HU JP PL ZA	0465709 A 9102948 A 2046457 A 1058122 A, B 9102104 A 60576 A 4233810 A 290991 A 9105313 A	15-01-1992 11-02-1992 13-01-1992 22-01-1992 19-02-1992 28-09-1992 21-08-1992 10-08-1992 25-03-1992
US 5347529 A	13-09-1994	EP JP	0582275 A 6209294 A	09-02-1994 26-07-1994
EP 0498456 A	12-08-1992	US AU AU CA DE DE ES JP JP JP JP US US	5132639 A 645878 B 1078292 A 2060117 A, C 69220514 D 69220514 T 2104741 T 7202763 A 2056370 C 4336819 A 7087403 B 5363056 A 5252930 A	21-07-1992 27-01-1994 07-01-1993 09-08-1992 31-07-1997 09-10-1997 16-10-1997 04-08-1995 23-05-1996 25-11-1992 20-09-1995 08-11-1994 12-10-1993

According to one aspect, the invention provides a lineariser for reducing distortion of an output signal of signal handling means by processing a raw signal with data selected from storage means on the basis of amplitude and frequency information of the raw signal. A lineariser of this type is versatile in that it can linearise, i.e. reduce distortion of, a signal which has experienced a distortion which varies with both amplitude and frequency. In addition, it is possible to adapt the data in the storage means so that the distortion reduction processing can be adapted to changes in the distortion.

The raw signal may be an input signal to the signal handling means. In this case, the lineariser functions as a predistorter which linearises the output of the signal handling means. Alternatively, the raw signal may be the output of the signal handling means. In this case, the lineariser functions as a post distorfer of the output signal emerging from the signal handling means.

Preferably, the storage means comprises a group of look-up tables, each look-up table corresponding to a component of the raw signal having a different frequency or band of frequencies. Each of the look-up tables comprises a table of coefficients, each coefficient being associated with a value of the amplitude of the component of the table. Advantageously, coefficients can be interpolated for amplitude or frequency values which do not have an associated coefficient in the group of look-up tables.

In a preferred embodiment, the lineariser comprises dividing means for dividing the raw signal into a number of components having different frequencies or bands of frequencies. The components of the raw signal may then undergo distortion reduction processing separately. The dividing means can comprise a group of filters, each filter transmitting a different component of the raw signal. Alternatively, the dividing means can comprise means for transforming the raw signal from the time domain to the frequency domain to produce a spectrum of the amplitude of the raw signal against frequency. In a preferred embodiment, the transforming means calculates a Fourier transform of the raw signal.

The lineariser may also comprise means for combining components of the raw signal. In one embodiment, the combining means adds the components together. In another

embodiment, the components are assembled into a frequency spectrum which is transformed to the time domain, preferably using an inverse Fourier transform technique.

Another advantage of the lineariser is that the data in the storage means may be altered to adapt distortion reduction processing to changes in the distortion. Preferably, therefore, the lineariser comprises means for adapting the data in the storage means to compensate for changes in the distortion characteristics of the signal handling means. Advantageously, the adapting means comprises means for monitoring feedback from the output of the signal handling means.

The lineariser can be used in conjunction with various kinds of distorting signal handling means, for example an amplifier and/or frequency converter. Their lineariser can be used on, or as part of, a transmitter which includes the distorting signal handling means.

According to a second aspect, the invention provides a method of reducing distortion of an output signal of signal handling means, said method comprising the steps of selecting data from storage means, on the basis of amplitude and frequency information about a raw signal, and using the data in distortion reduction processing of the raw signal.

The above method may be used to reduce distortion of an output signal of signal handling means in a transmitter, so that the output of the transmitter is linearised.

Certain embodiments of the invention will now be described, by way of example only, and with reference to the accompanying figures, in which:

Figure 1 is a block diagram of a digital transmitter;

Figure 2 is a block diagram of a filter based three dimensional look-up table predistorter;

Figure 3 illustrates a three dimensional look-up table;

Claims

1. A lineariser for reducing distortion of an output signal of signal handling means, by processing a raw signal with data selected from storage means on the basis of amplitude and frequency information of the raw signal.
2. A lineariser according to claim 1, wherein the data comprises coefficients and the distortion reduction processing comprises modification of the raw signal using the coefficients.
3. A lineariser according to claim 2, wherein the modification to the raw signal comprises multiplication of coefficients with amplitude values of the raw signal.
4. A lineariser according to any preceding claim, wherein the storage means comprises a group of look-up tables, each table corresponding to a component of the raw signal having a different frequency or band of frequencies, and each table comprising a table of coefficients, each coefficient associated with a value of the amplitude of the component of the table.
5. A lineariser according to claim 4, further comprising means for retrieving coefficients from the group of look-up tables on the basis of amplitude values of and frequency information about components of the raw signal.
6. A lineariser according to claim 5, wherein coefficients are interpolated for amplitude and/or frequency values which do not have an associated coefficient in the group of look-up tables.
7. A lineariser according to any preceding claim, further comprising means for dividing the raw signal into a number components having different frequencies or bands of frequencies.
8. A lineariser according to claim 7, wherein the dividing means comprises a group of filters, each transmitting a different component of the raw signal.

18. A lineariser according to any preceding claim, further comprising means for adapting the data in the storage means to compensate for changes in the distortion characteristics of the signal handling means.
19. A lineariser according to claim 18, wherein the adapting means comprises means for monitoring feedback from the output of the signal handling means.
20. A lineariser according to claim 19, wherein the adapting means supplies components of the feedback and corresponding components of the raw signal to a divider which produces signals which are used to adapt the data in the storage means.
21. A lineariser according to any preceding claim, wherein the signal handling means comprises amplifying means and/or frequency converting means.
22. A lineariser according to any preceding claim, wherein the raw signal is an input signal to the signal handling means.
23. A lineariser according to any one of claims 1 to 21, wherein the raw signal is an output signal from the signal handling means.
24. Signal handling apparatus comprising signal handling means which distorts signals, and a lineariser according to any preceding claim.
25. Transmitting apparatus comprising signal handling apparatus according to claim 24 and antenna means for transmitting the output signal of the signal handling means.
26. A base station or a mobile unit comprising the transmitting apparatus of claim 25.
27. A lineariser or a transmitter substantially as herein described with reference to the accompanying drawings.

28. A method of reducing distortion of an output signal of signal handling means, said method comprising the steps of selecting data from storage means on the basis of amplitude and frequency information about a raw signal, and using the data in distortion reduction processing of the raw signal.
29. A method according to claim 28, wherein the data comprises coefficients and the distortion reduction processing comprises modification of the raw signal using the coefficients.
30. A method according to claim 29, wherein the modification to the raw signal comprises multiplication of coefficients with amplitude values of the raw signal.
31. A method according to any one of claims 28 to 30, wherein the storage means comprises a group of look-up tables, each table corresponding to a component of the raw signal having a different frequency or band of frequencies, and each table comprising a table of coefficients, each coefficient associated with a value of the amplitude of the component of the table.
32. A method according to claim 31, further comprising the step of retrieving coefficients from the group of look-up tables on the basis of amplitude values of and frequency information about components of the raw signal.
33. A method according to claim 32, comprising the step of interpolating coefficients for amplitude and/or frequency values which do not have an associated coefficient in the group of look-up tables.
34. A method according to any one of claims 28 to 33, further comprising the step of dividing the raw signal into a number components having different frequencies or bands of frequencies.

35. A method according to claim 34, wherein the dividing step comprises the step of filtering the raw signal using a group of filters, each transmitting a different component of the raw signal.
36. A method according to claim 34, wherein the dividing steps comprises the step of transforming the raw signal from the time domain to the frequency domain to produce a spectrum of the amplitude of the raw signal against frequency.
37. A method according to claim 36, wherein the dividing steps comprises calculating a Fourier transform of the raw signal.
38. A method according to claim 36 or 37, further comprising the step of segmenting the spectrum into components each having a different frequency or band of frequency.
39. A method according to any one of claims 28 to 38, further comprising the step of combining components of the raw signal having different frequencies or bands of frequencies to form a reassembled signal.
40. A method according to claim 39 when not dependent on any of claims 36 to 38, wherein the combining step comprises summing components of the raw signal.
41. A method according to claim 39 when not dependent on claim 35, wherein the combining step comprises reassembling components together to form a reassembled spectrum.
42. A method according to claim 41, further comprising the step of transforming the reassembled spectrum from the frequency domain to the time domain to create the reassembled signal.
43. A method according to claim 42, wherein the reassembled spectrum is transformed using an inverse Fourier transform technique.

44. A method according to any one of claims 39 to 43, wherein the reassembled signal is the raw signal which has undergone distortion reduction processing.
45. A method according to any one of claims 28 to 44, further comprising the step of adapting the data in the storage means to compensate for changes in the distortion characteristics of the signal handling means.
46. A method according to claim 45, wherein the adapting step comprises the step of monitoring feedback from the output of the signal handling means.
47. A method according to claim 46, wherein the adapting step comprises supplying components of the feedback and corresponding components of the raw signal to a divider, and performing a dividing operation using the components to produce signals for adapting data in the storage means.
48. A method according to any one of claims 28 to 47, wherein the signal handling means comprises amplifying means and/or frequency converting means.
49. A method according to any one of claims 28 to 48, wherein the raw signal is an input signal to the signal handling means.
50. A method according to any one of claims 28 to 48, wherein the raw signal is an output signal from the signal handling means.
51. A method of transmitting a signal comprising the steps of providing a signal for transmission, processing the signal using signal handling means to produce an output signal, reducing distortion of the output signal using the method of any one of claims 28 to 50, and transmitting the distortion-reduced output signal from antenna means.
52. A method of reducing distortion of an output signal of signal handling means, the method being substantially as herein described with reference to the accompanying drawings.